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Abstract

The Philadelphia Board of Education has begun to consider the purchase and conversion of ccmmercial and industrial structures for use as teaching facilities. One such building, a six-story fireproof loft building, has been purchased for this purpose. This study investigates the possibilities and limitations of conversion and points up the capabilities and difficulties of such an approach. It is divided into four parts--(1) a description of the spatial and structural characteristics of the loft building, (2) an analysis of its capacity to meet general design criteria for teaching spaces, (3) an outline of the program for an intensive learning center, and (4) a design proposal incorporating specific design recommendations. (TC)

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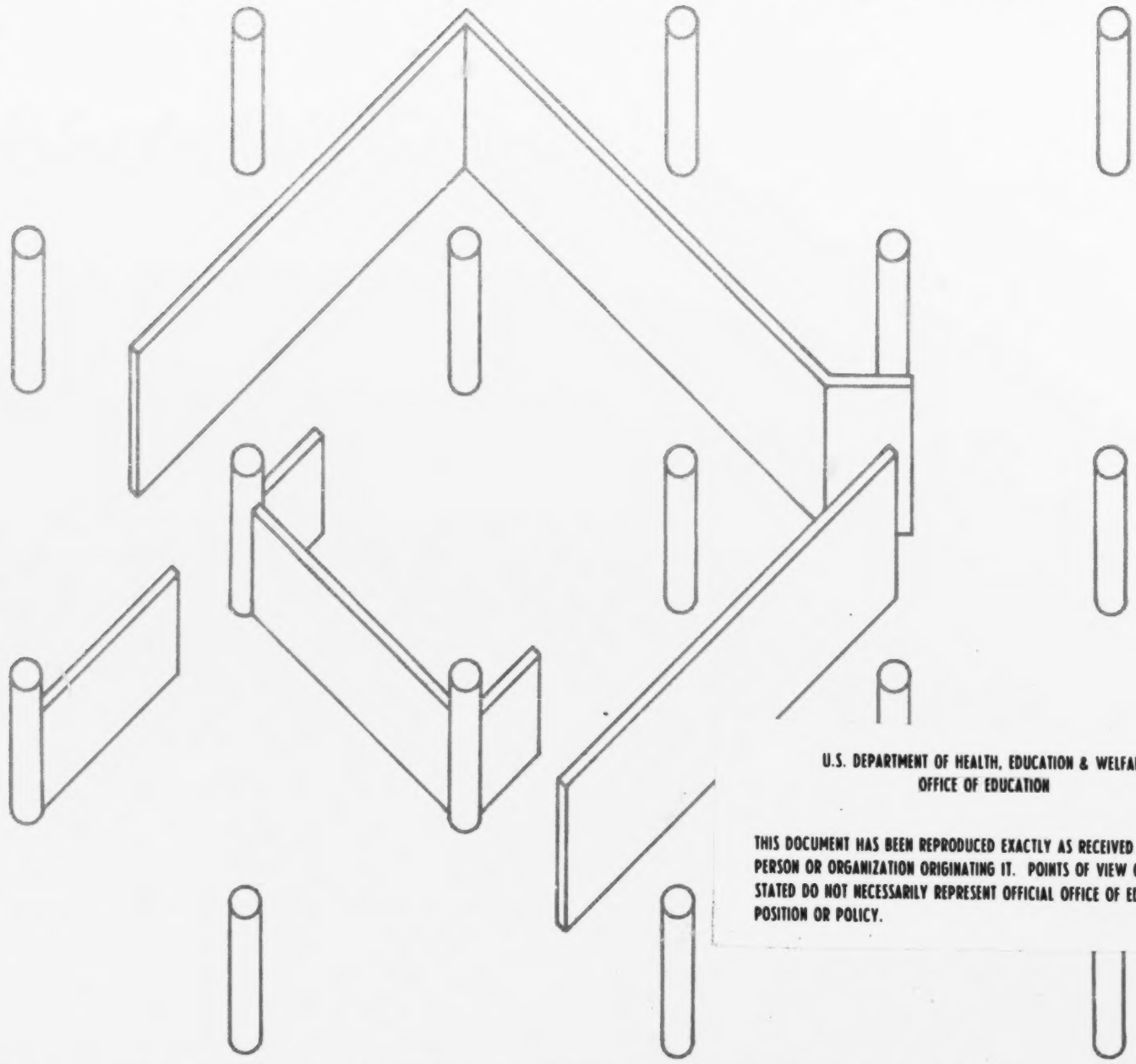
THE LOFT BUILDING AS A SCHOOL HOUSE: A STUDY FOR THE SCHOOL DISTRICT OF PHILADELPHIA

Murphy Levy Wurman Architecture and Urban Planning Philadelphia



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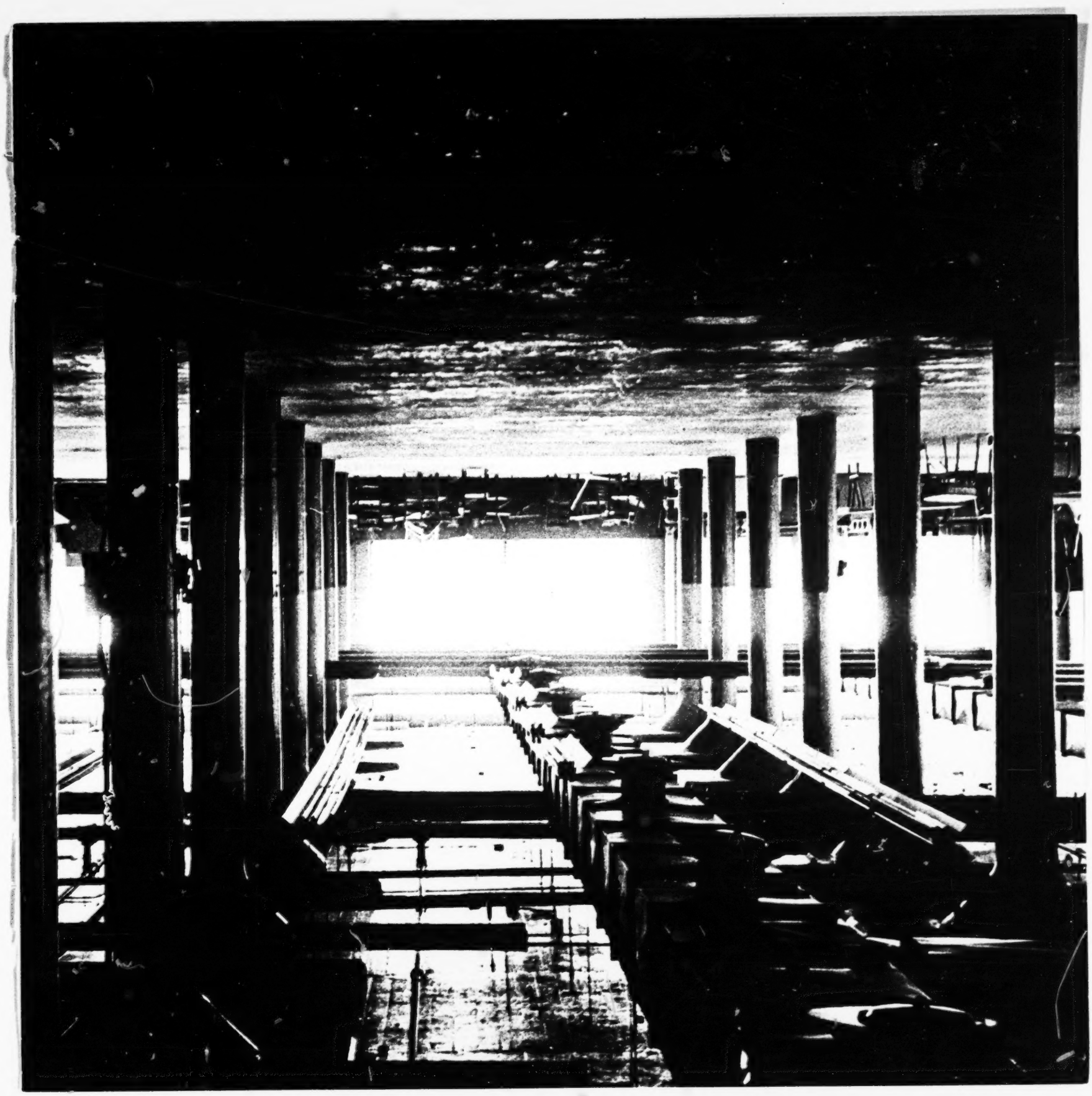
The Philadelphia Board of Education has begun to consider the purchase and conversion of commercial and industrial structures for use as teaching facilities. One such building, a six-story fireproof loft building at 5th and Luzerne Streets has been purchased for this purpose. The aim of this study is to investigate the possibilities and limitations of conversion and point up the capabilities and difficulties of such an approach.

This is a case study. The building is the factory loft at 5th and Luzerne. The programs are those actually scheduled for use in the building. One in particular, the Intensive Learning Center, forms the specific program material. The intention of the study is to provide, beyond a general analysis, specific architectural recommendations which could form the basis of an early construction program.

There are four parts. 1. The loft building, a description of the spatial and structural characteristics of the building. 2. The loft building as a school house, an analysis of its capacity to meet general design criteria for teaching spaces. 3. The test program, the Intensive Learning Center program and 4. A design proposal incorporating specific design recommendations.

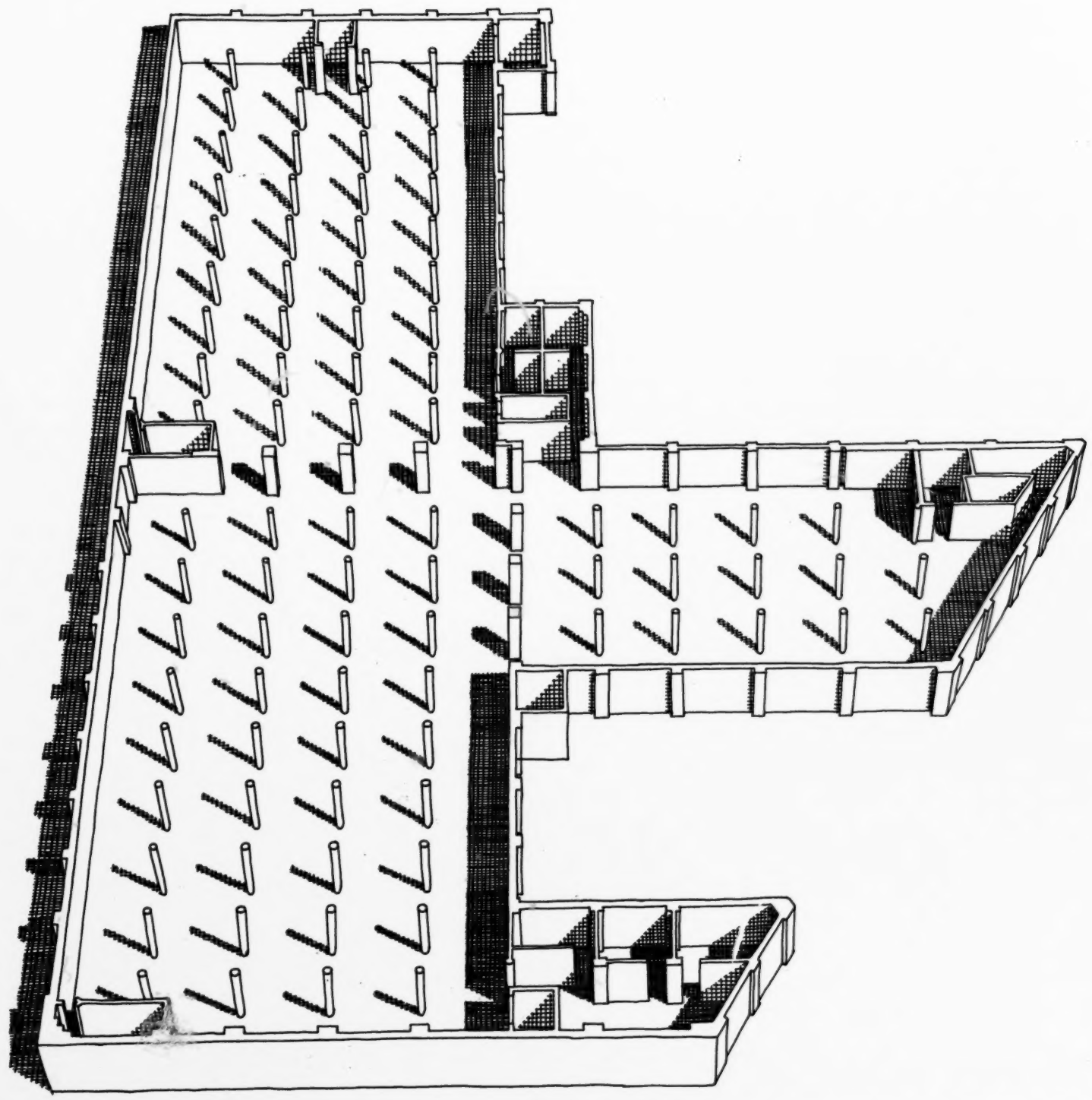
Photograph Don Matzkin



THE LOFT BUILDING: Fifth and Luzerne Streets

Building configuration, structure, circulation and services, fenestration and building codes have been isolated as the factors most critically affecting a potential reuse of the building. The following is an analysis of these factors and the ways in which they might limit reuse of the building as a school facility.

Photograph Don Matzkin



CONFIGURATION AND STRUCTURE, TYPICAL FLOOR

CONFIGURATION AND STRUCTURE

The Loft is six floors high with 36,150 square feet on each floor and a partial basement. The six floors are identical, each with a long rectangular space of 27,500 square feet and two wings of 7,250 and 1,400 square feet, a total of 217,000 square feet for the six floors excluding the basement.

The major limitation imposed by the building's configuration, and one likely to be the major factor in most industrial structures, is dimensional. From the standpoint of conventional classrooms the space is too wide. The problem is how to maximize this potentiality for more space.

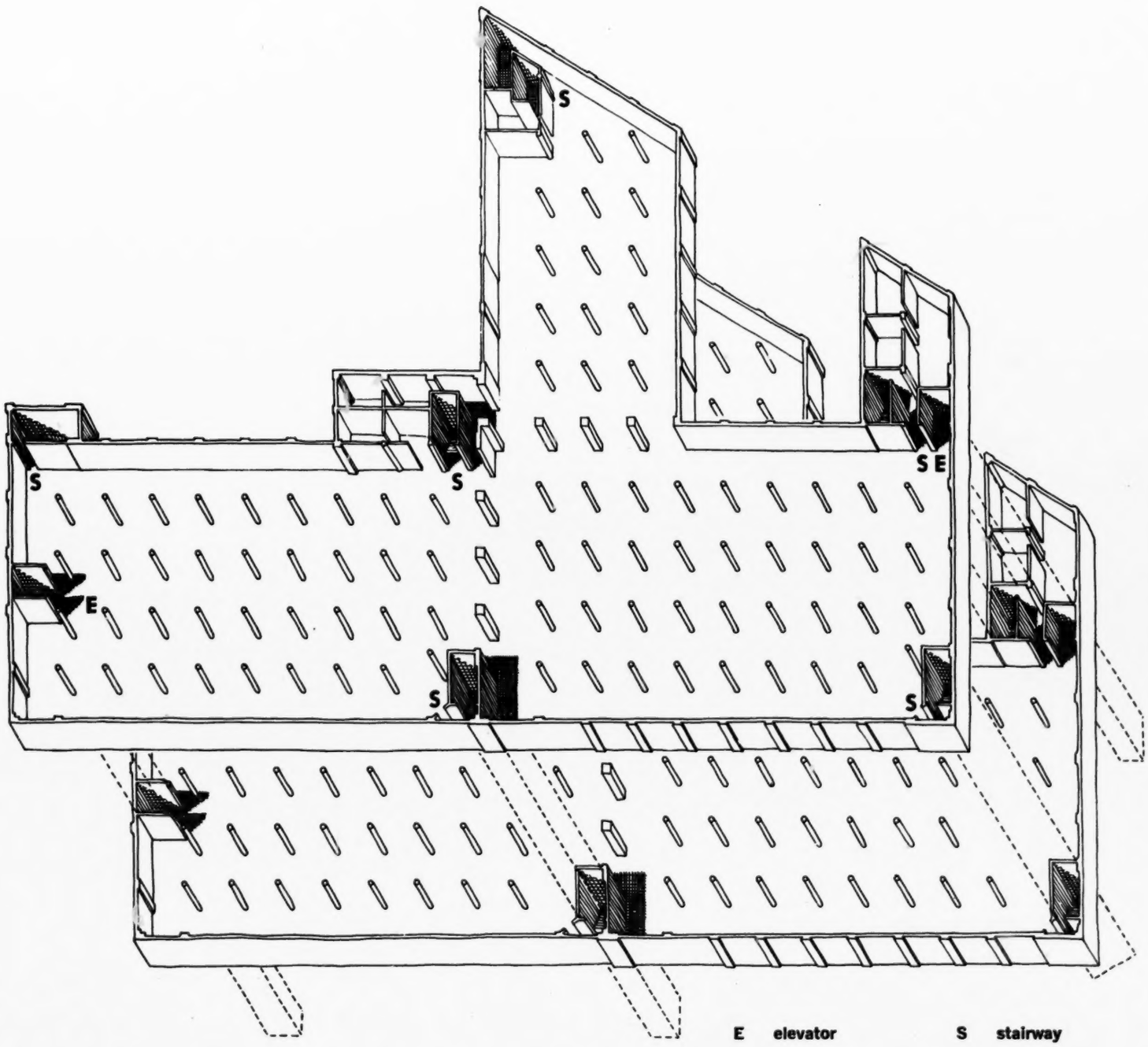
The presence of over 90 large concrete columns distributed in a relatively narrow grid pattern throughout each floor is the singular most apparent physical feature of the interior spaces. It presents the most obvious limitations in the form of limited site lines, inflexibility, obstructions to movement and group organization.

There is little possibility of good active play space or for large groups viewing single screen presentations.

With minor variations the columns are on a grid 18′-6″ in one direction and 15′-0″ in the other. They are round with a few exceptions and vary in dimension on each floor averaging 2′-6″ in diameter.

The floors are a combination of reinforced concrete and steel encased in concrete. The outer walls are masonry and glass block in-fill.

The 13-foot ceiling height and lack of any structural interior walls are beneficial. Only the columns present a clear problem.



E elevator S stairway

8 HORIZONTAL AND VERTICAL CIRCULATION DETERMINANTS, TWO TYPICAL FLOORS

BUILDING CIRCULATION: Horizontal and Vertical

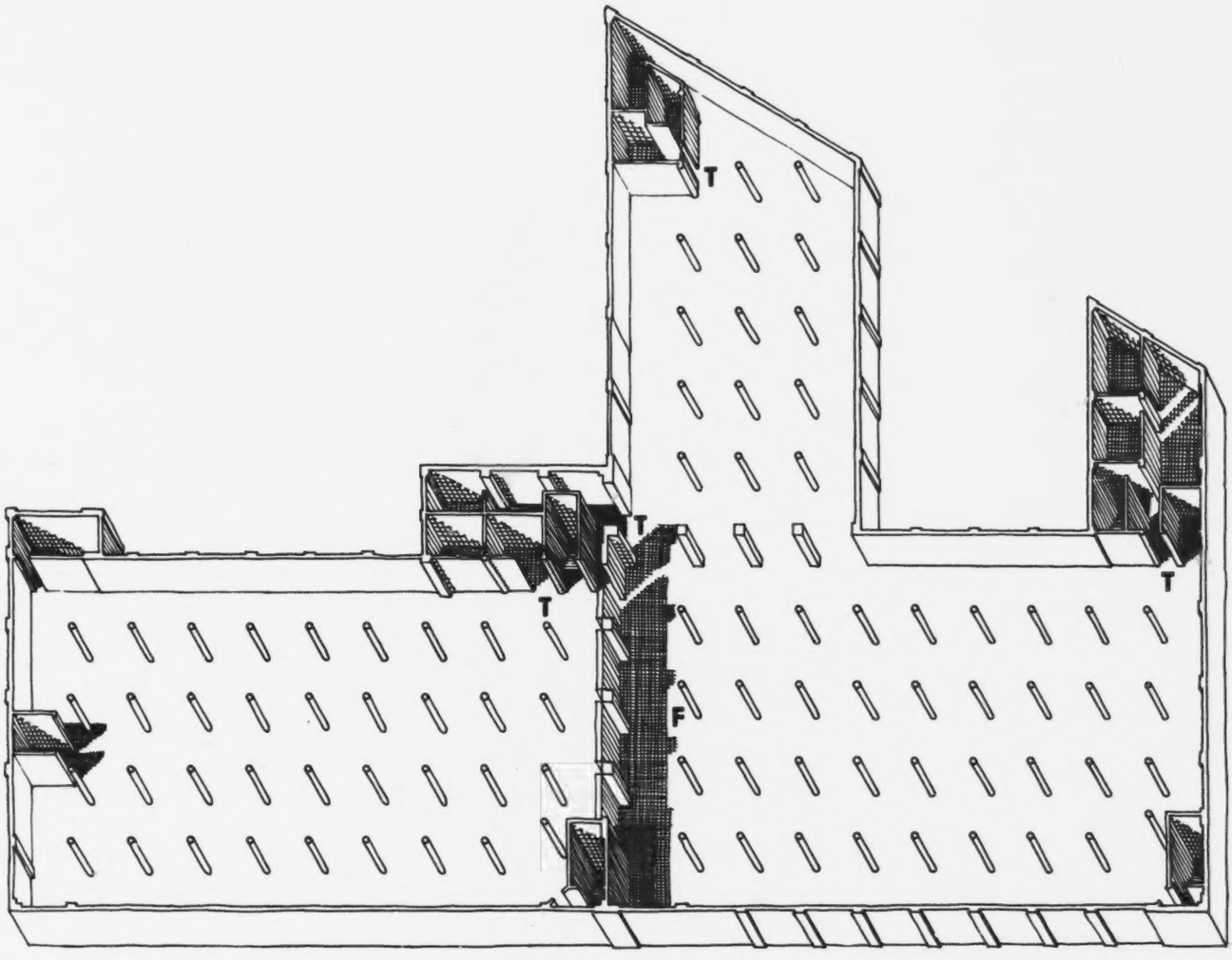
The building is serviced by six stairways and two elevators. The elevators are located at opposite ends of the building. The stairs are evenly distributed along the outside wall.

By nature of the building siting only two stairs are immediately accessible from potential building entrances and only one of the elevators is located near an entrance.

This requires internal circulation on the ground floor in order to reach the upper floors by means other than these two stairways and one elevator. In light of the building area and probable population this will cause some circulation problems affecting the ground floor primarily.

The easy access between floors via the six stairways presents some problems for security and control. Any major subdivision of uses horizontally or vertically will have to respond to this factor.

Horizontal movement — on one floor — is most likely to have destinations on the east wall where four of the six stairs, both elevators and all three bathroom cores are located. This will have an affect upon floor planning.



T toilets F firewall

BUILDING SERVICES: Toilets, Mechanical Supply and Equipment Rooms

Detailed analysis of electrical and mechanical equipment was not made in light of the decision to proceed as required to revise the entire system for the special requirements of classroom use.

There are no apparent problems in power supply, space for equipment or distribution. A hung ceiling would be almost mandatory for acoustical purposes and mechanical distribution.

The limitations imposed by this area of concern develop from the location and space occupied by toilets and equipment rooms.

The toilets are located in three vertical cores. One in the center of the east wall, the second and third being located at the extreme east end of the two wings. These cores present some problems in available areas but the greatest effect is upon circulation.

Other mechanical spaces affect the ground floor where electrical equipment such as transformers and switch gears occupy disconnected spaces in the main space.

Large return air grilles in one corner restrict uses in their vicinity for reasons of access and noise level.

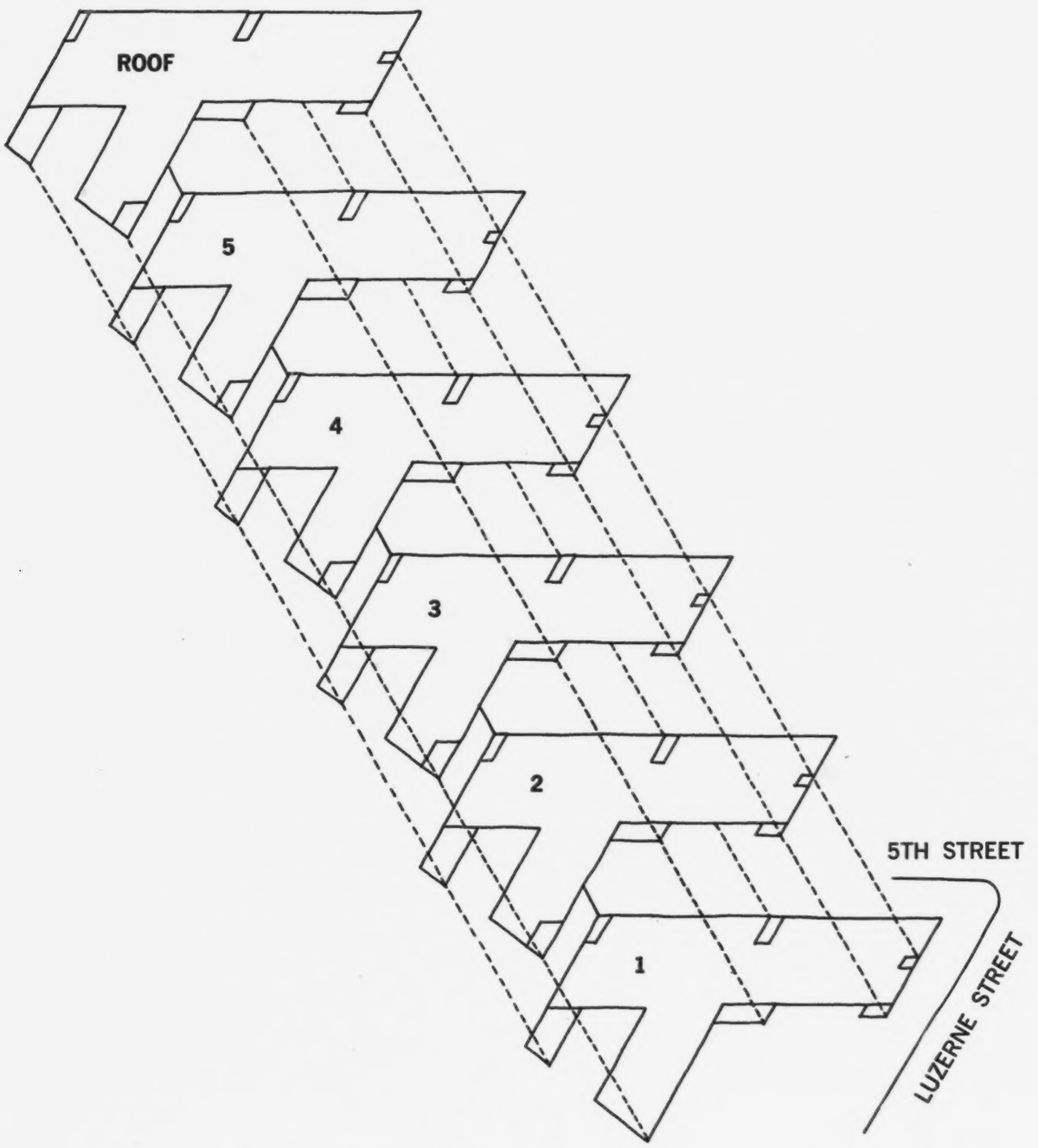
CODE REQUIREMENTS

The problems presented by codes and ordinances were threefold:

Exits: The original plan contained more than adequate stairways of a fireproof nature to meet the requirements of the Fire Code.

Fenestration: The lack of operable windows for ventilation and light is in conflict with the codes thus requiring variances.

Continuous Floor Area: The fire regulations limit the amount of undivided floor space on any floor without fire separation. The square foot area per floor (27,500 square feet) is above this limit for this particular structural category requiring a fire division. This fire division is located in the center of the main space at a point where the structural bay changes. This is reasonable from a structural and fire code viewpoint, but will limit space flexibility on all floors.


ROOF
5
4
3
2
1
5TH STREET
LUZERNE STREET

FENESTRATION

All fenestration is in the form of glass block in-fill almost continuous on all floors from a sill height of 3′-6″ approximately.

This is not true on the east wall of the ground floor where loading and service areas block fenestration.

There are no operable windows or clear glass windows in the building.

The effect of this limitation has been argued in many research papers pro and con. For purposes of this study and plan the existing fenestration limitations have been accepted as given on the assumption that if taken advantage of in the best interests of the plan, the detrimental affects, if any, would be minimized.

BUILDING SITING

The building occupies a large irregular corner lot at the busy intersection of 5th and Luzerne Streets. The building abutts both the 5th Street lot line, the south property line (adjoining other structures) and portions of the Luzerne Street and rear lot lines.

The only usable open space fronts on Luzerne Street.

The present entrance is a fire stair entrance off Luzerne Street. Immediate recommendations call for new entrances on the corner of 5th and Luzerne Street and from the open yard into the center of the building at the central stairway.

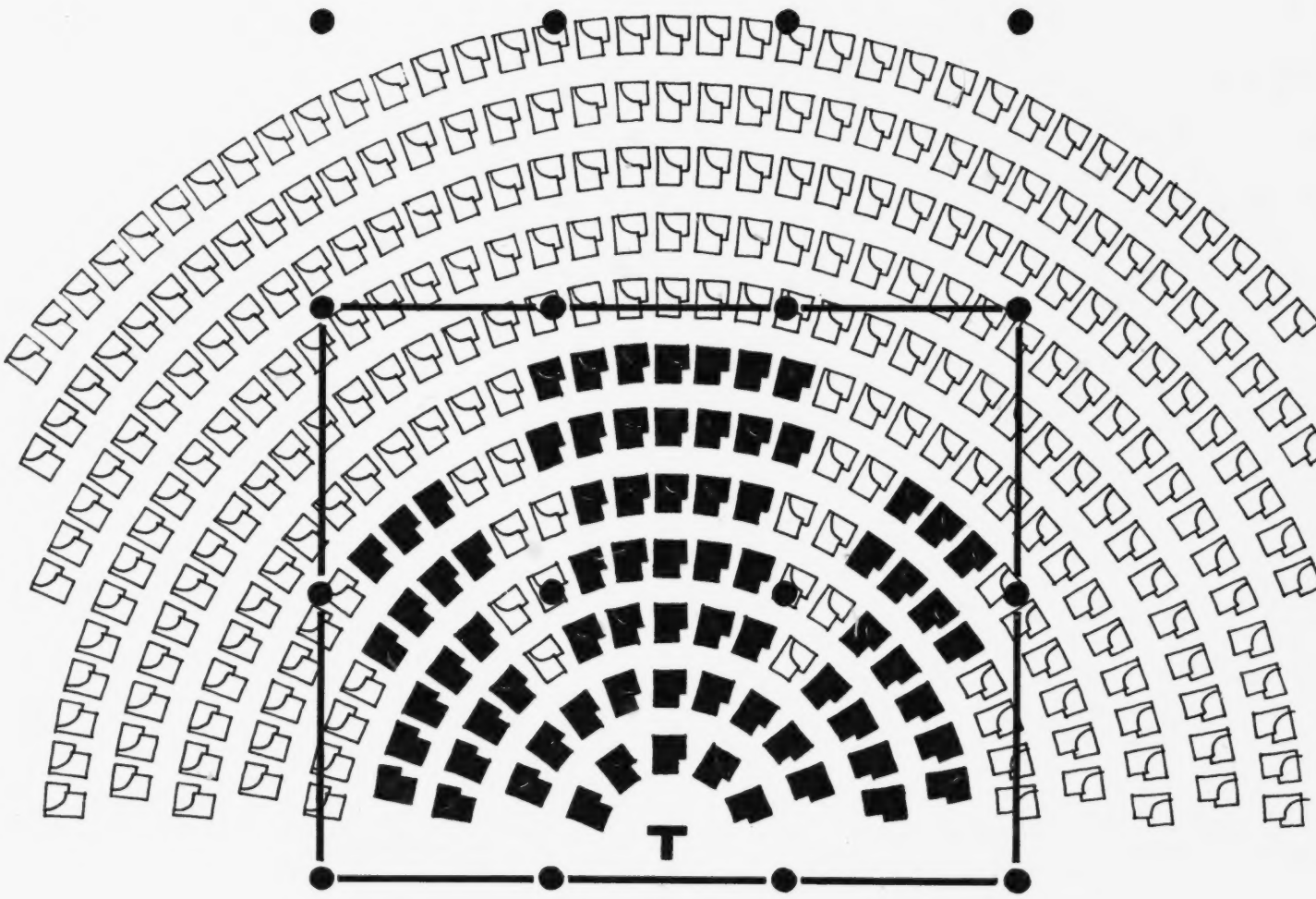
Truck loading is provided off the rear street with good access to one elevator (the rear elevator).

The major limitations involve open play space and parking.

THE LOFT BUILDING AS A SCHOOL HOUSE

An analysis of the building's capacity to meet related functional and design criteria for school spaces and organization: seating capacity, sight lines and control, circulation, spatial flexibility, vertical space distribution and provision of large group space.

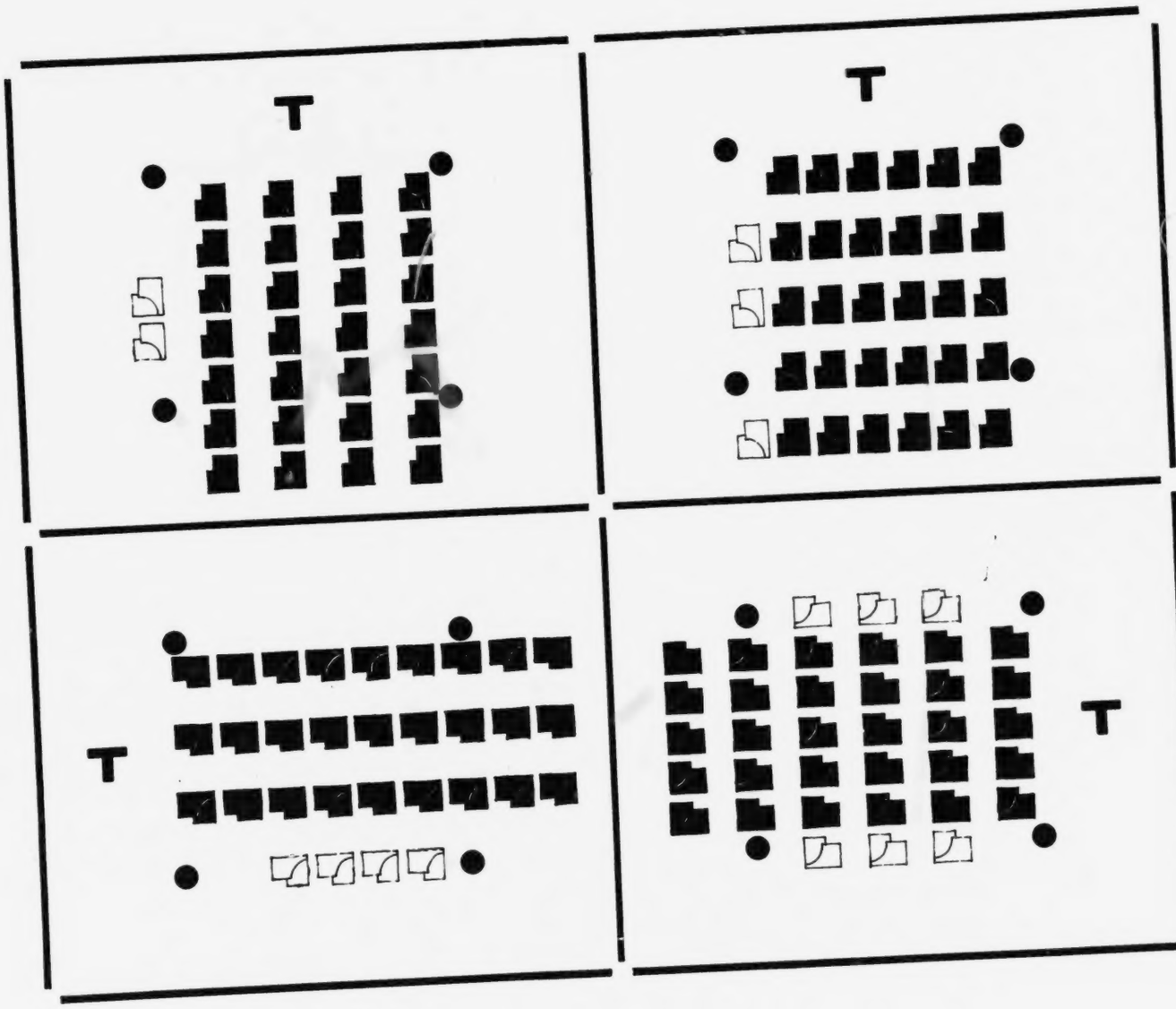
Photograph Don Matzkin



CLASSROOM SEATING

In order to determine the specific limitations imposed by the column grid upon classroom seating, front to back, side to side and radial aisle arrangements facing in both directions of the column grid have been studied.

It is clear that the span is adequate to accommodate seating in any conventional arrangement as long as major circulation is beyond the columns. Facing the class toward the 19′-0″ dimension allows seating layouts comparable to most 30 pupil classrooms. To achieve this capability, it is necessary to position walls between the columns being certain to allow safe passage between all columns and walls.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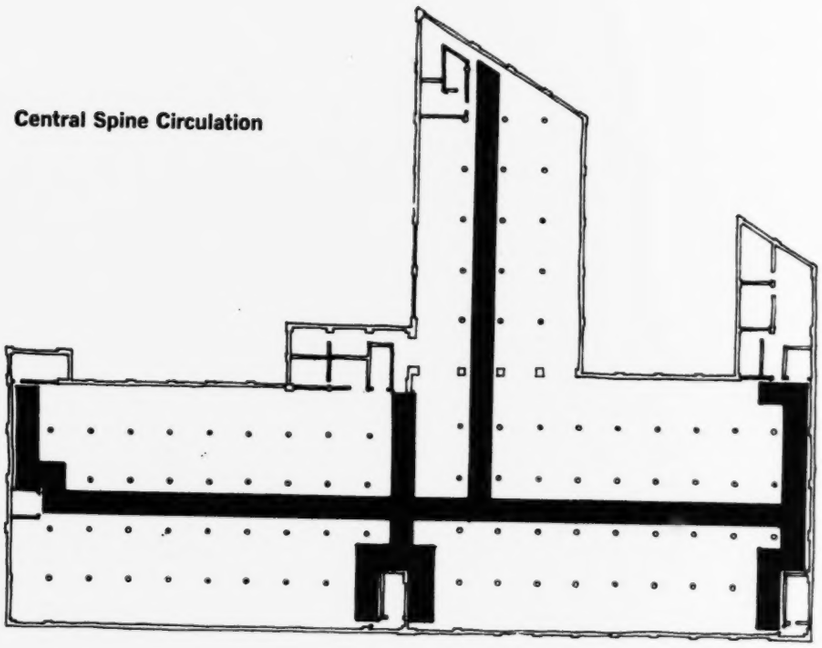
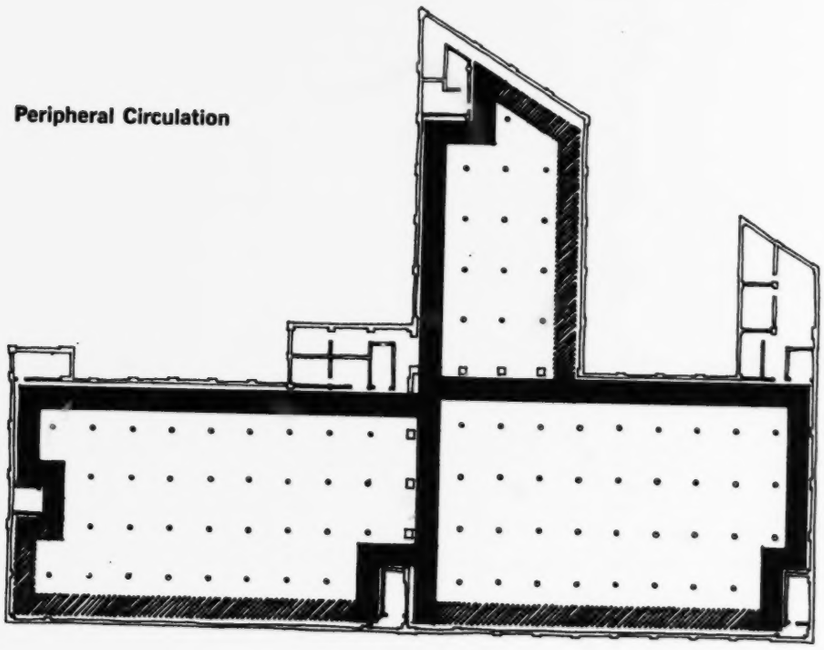
Central Spine Circulation



Peripheral Circulation



CIRCULATION

Assuming major access to floors is via the elevators and staircases along the east wall, the principal horizontal circulation alternatives are a central spine feeding peripheral rooms, or a peripheral system feeding central spaces.

A peripheral circulation system has the advantages of capitalizing on the potential of large, unbroken areas of space for flexible planning and minimizing the disadvantages of the inefficient dimension for peripheral classrooms. Conversely, the central spine allows very limited scope for teaching space flexibility and implies inefficient use of floor area.

Each element of the vertical circulation system of staircases and elevators, by virtue of location and accessibility, has a different value for the purposes of orientation, control and access convenience.

The elevator closest to Luzerne Street serving the main space on each floor suggests its use as the primary passenger elevator with the rear elevator serving both service and passenger functions. This is reasonable by virtue of the location of the loading docks near this elevator.

Two staircases, one located on Luzerne Street and the second in the center of the east wall complement the Luzerne Street elevator suggesting use as major through staircases connecting all floors with the ground.

If the demands for security and privacy are to be met on the teaching floors, the other four staircases must be limited in use to intra-floor circulation and emergency exits.

DISTRIBUTION OF USES AND FLEXIBILITY OF USE

The capacity to absorb changing teaching techniques, to accommodate change in use, internal relationships or space needs is likely to be a major criterion for success in any school operation. The spatial distribution of uses and building configuration are key to this need for flexibility.

To minimize the potential deterrent to flexibility inherent in a multi-level structure and to maximize the potential flexibility arising out of large floor areas, it is suggested that major organizational divisions within the institution take place vertically, floor by floor, permitting a maximum adaptability to internal growth and change to take place within self-contained teaching, or research or administrative and service compartments on separate floors unrestricted by overlap with other segments of the organization.

Following this reasoning, it is recommended that the main space on each floor be used entirely for classroom space with only those service and administrative functions necessary for support. Major supporting functions for each compartment, auditoriums, group spaces, computer and TV centers, cafeterias should be located in such a way that will not infringe on main teaching space, i.e., in the wings.

Although the needs of institutions will obviously differ there are general criteria for the relative disposition of uses vertically; access priorities (the most frequently used, highest traffic generators on the first floor, et cetera), service access needs (cafeterias and kitchen with access to streets), control and security, privacy and age groupings. Thus, recommended uses on the first floor are those requiring after-hour use; the adult education area, and those requiring major service; the cafeteria and kitchen, and building control; security and first-aid office.

The second floor is programmed for classrooms and library to support the adult education area, auxiliary uses and expansion classrooms.

The upper four floors are to be used by the two special programs, the Intensive Learning Center and the Pennsylvania Advancement School. Also related to these units and located on the upper floors is the computer center and TV studio.

The first choice would be to locate the younger children on the lowest floors (third and fourth floors) but as a result of work proceeding in advance of this study this disposition of uses has been reversed with the Intensive Learning Center aimed at younger children located on the sixth and sharing the fifth with the computer center.

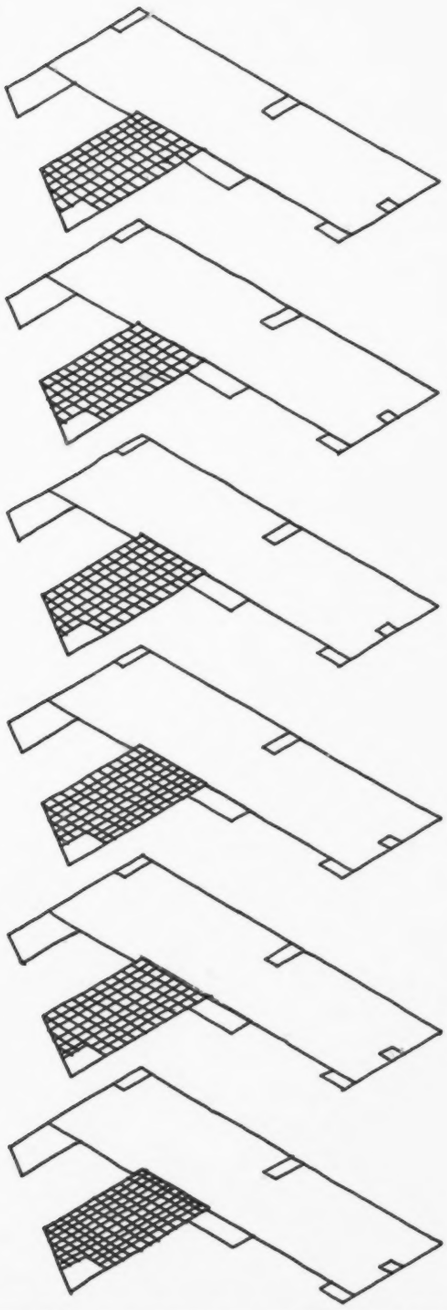
In total 85% of the floor area in the main space for all floors is programmed for classroom and classroom-related uses as recommended.

LARGE GROUP SPACE

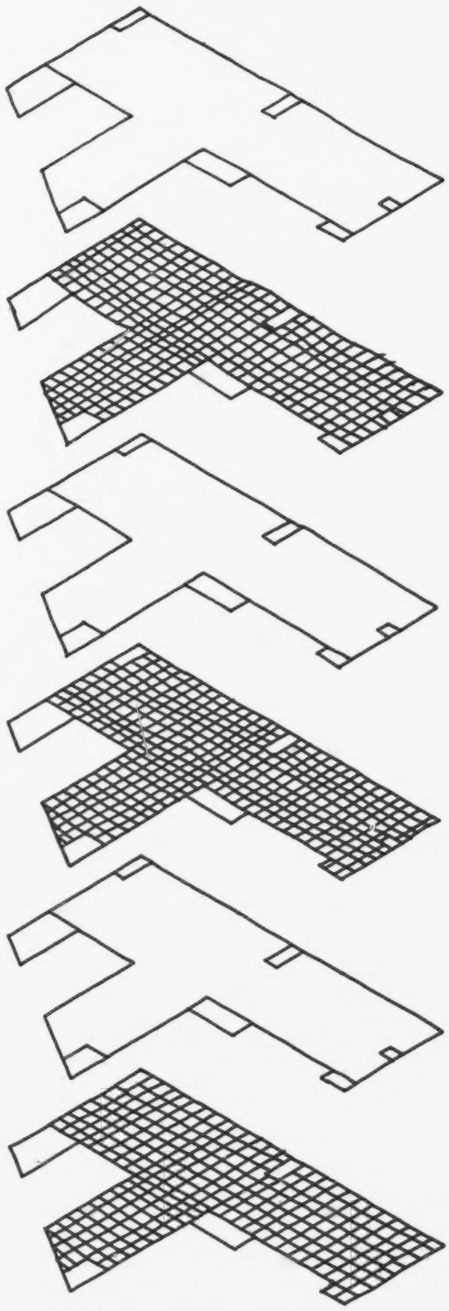
The development of recreation areas and conventional auditoriums presents a special problem. As previously noted, the structural system (the column grid) is a serious obstruction to both open play space or to group spaces set up specifically for audio visual materials. Group spaces for as many as 60 children present no problems. Groups of 150 can be accommodated but not for the purpose of single screen presentations.

Thus, the only recommendation which can be made is to construct other spaces, column free, for active play space or conventional auditorium use. For the purpose of movies and other visual presentations, one solution is to work with multiple screen viewing or video.

Space is available on site for limited construction of a space for active play. It would be preferable if such a structure could be dismounted in warm seasons. One idea would be air structures or tents.



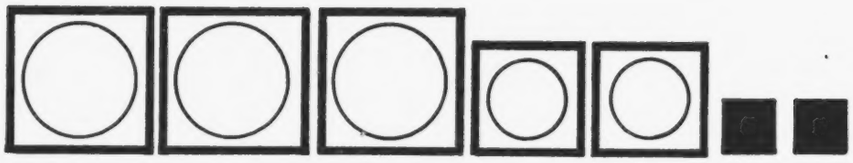
(A) Flexibility: Like uses positioned for Expansion Capability.



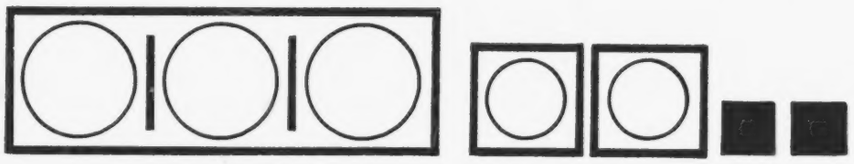
(B) Restricted Flexibility: Departments positioned regardless of different space needs.

VERTICAL DISTRIBUTION OF USES ALTERNATIVES

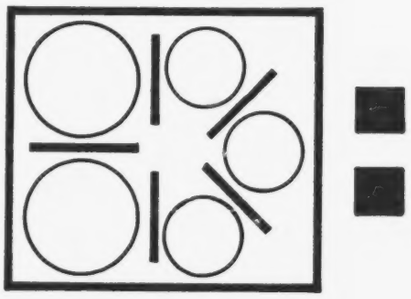
Individual Classrooms — Inflexibility



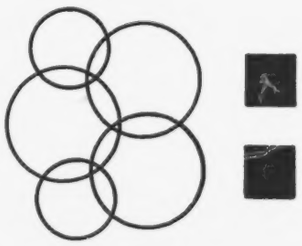
Team Rooms — Limited Flexibility

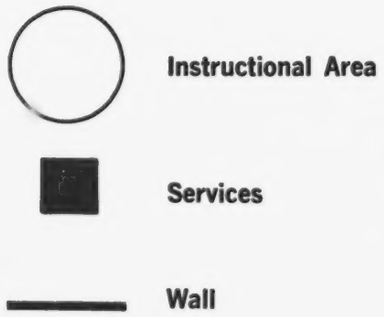


Space Division — Increased Flexibility

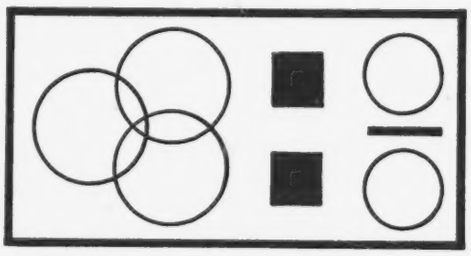


Free Space — Total Flexibility without Control





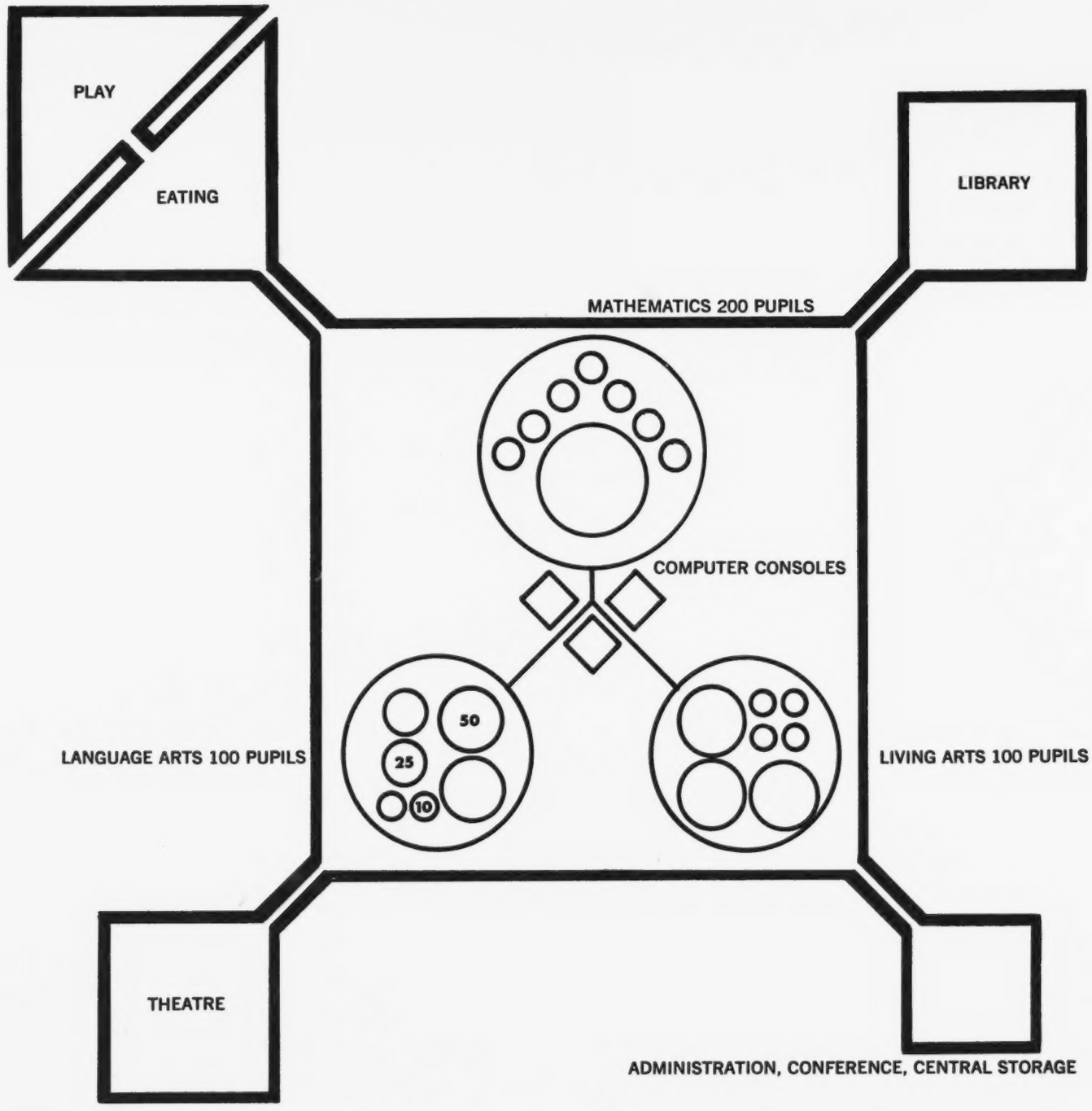
Combination of Free Space and Limited Space — Flexibility with Control



THE TEST PROGRAM: The Intensive Learning Center

An outline of the program for an intensive learning center, identifying the space needs functional relationships, functional organization and criteria.

Photograph Philip Burton


PLAY
EATING
LIBRARY
MATHEMATICS 200 PUPILS
COMPUTER CONSOLES
50
25
10
LANGUAGE ARTS 100 PUPILS
LIVING ARTS 100 PUPILS
THEATRE
ADMINISTRATION, CONFERENCE, CENTRAL STORAGE

AN INTENSIVE LEARNING CENTER

The initial program for this facility included a number of basic units. These included adult education, auxiliary classrooms, a computer center, and two special programs involving new techniques and goals. In addition, the usual requirements existed for eating facilities, meeting rooms, administrative spaces, libraries, group spaces and recreation areas.

For purposes of this study one specific program was selected for detailed development, the plans resulting to be tested against the needs for the other programs.

The program selected was the proposed Intensive Learning Center because its program required great flexibility and the space required was limited to one and a half floors further testing the problems of a multi-program facility.

The following is an analysis of the program for an Intensive Learning Center.

SPACE REQUIREMENTS

a. Instructional areas for approximately 350 students, elementary school age, in three major subject areas—language arts, living arts, mathematics. These instructional areas require optimum flexibility for different size groups, different purposes and differing requirements for privacy and control.
b. Storage areas of two basic types: Storage directly related to each of the three subject areas and central storage for the entire Intensive Learning Center.
c. Teachers' rooms for preparation, administration and planning.
d. Administrative offices for:
   Program Director
   Assistant Program Director
   Two secretaries
   Four Intake Offices for Counselors, Psychologists.
e. Library area with study carrels, TV center, librarian's office and workroom.
f. Auditorium or large group meeting room.
g. Recreation Area.
h. Computer room (related initially to the Mathematics Area) for six consoles to be connected to the facility's central computer bank.

ADDITIONAL REQUIREMENTS

The instructional areas were to be relatively private, sound controlled and as flexible as possible.

They were to operate with a good level of self-sufficiency. Each subject area to be directed by a head teacher with a team of teachers in support.

Student.

Independent Study: Computer, Carrel, Tape.

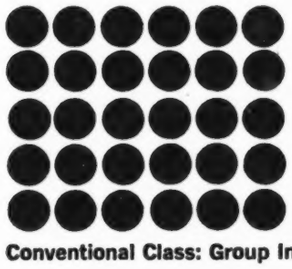
Student Teacher.

Individualized Study: Tutoring.

10 Students Teacher.

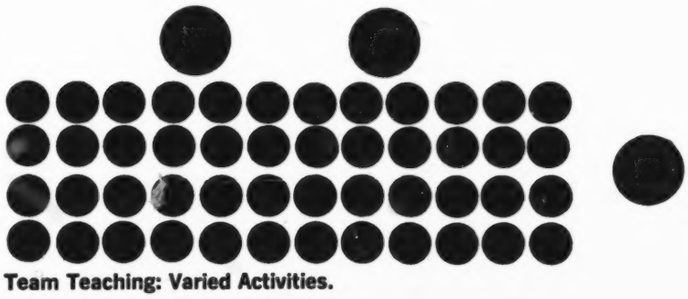
Student Participation: Small Group Learning, Laboratory, Seminar.

30 Students Teacher.



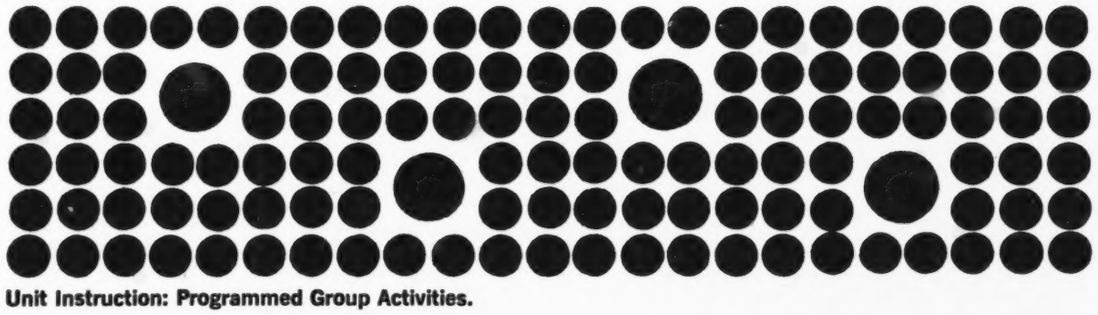
Conventional Class: Group Instruction.

75-100 Students Team of Teachers and Assistants.

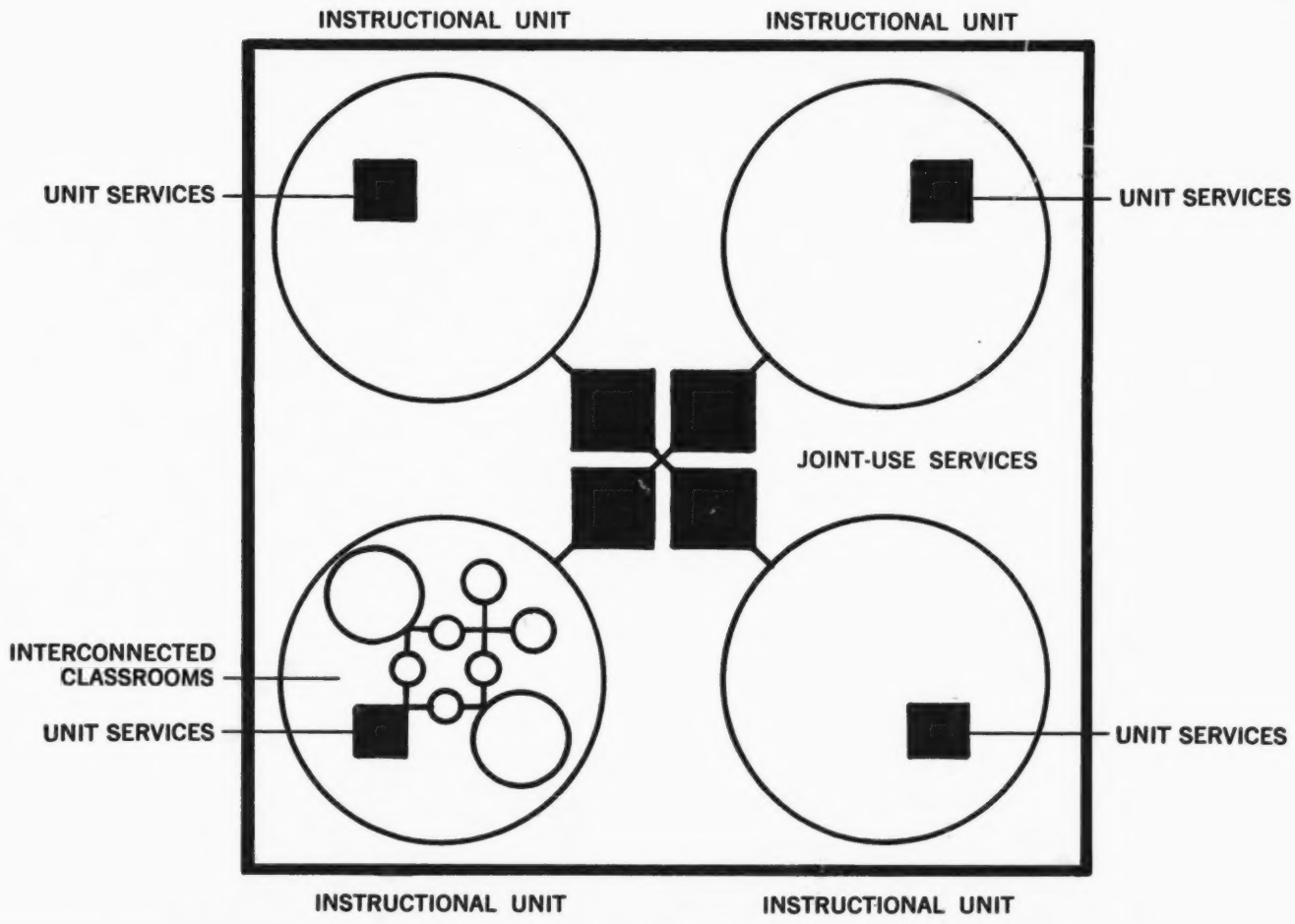


Team Teaching: Varied Activities.

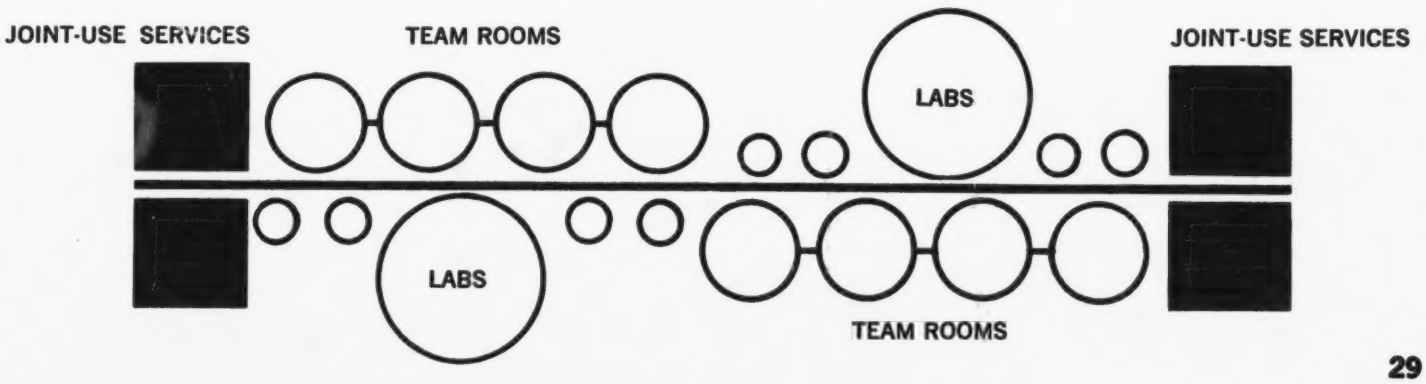
100-200 Students Unit Director Teachers Assistants.



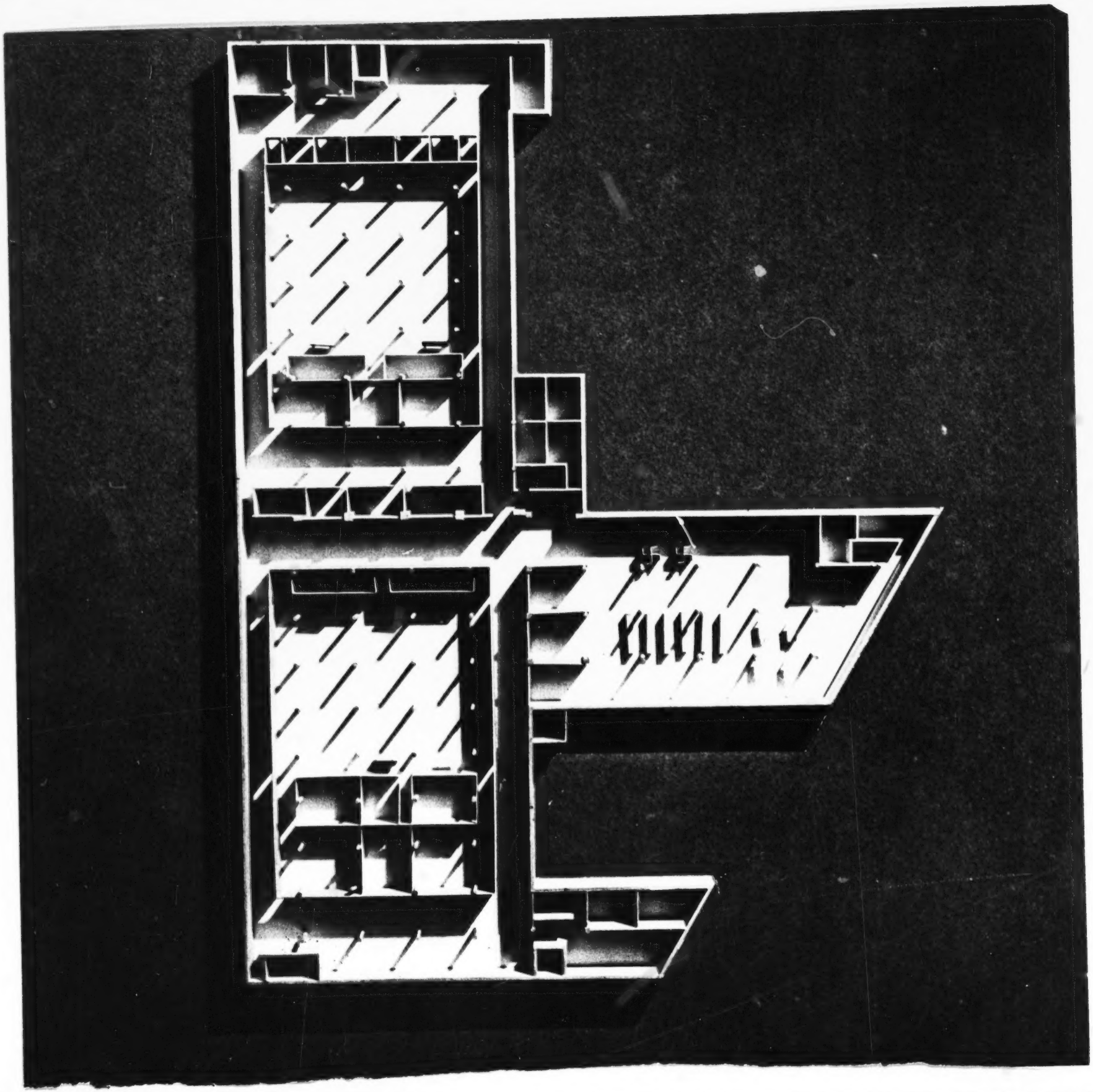
Unit Instruction: Programmed Group Activities.



GROUP TEACHING RELATIONSHIP



TEAM TEACHING RELATIONSHIP (Diagrammed for comparison only)



A DESIGN PROPOSAL: The Intensive Learning Center

The final step in this study is the coordination of the preceding analysis and investigation to arrive at a specific architectural design for the Intensive Learning Center located on the sixth and half of the fifth floors of the 5th and Luzerne Streets facility.

THE TEACHING COMMUNITY

The solution proposes the creation of three large teaching "communities" "walled in" for sound, privacy and security.

All columns are free-standing where feasible, allowing five feet clear between columns and walls for easy circulation.

Each "community" contains a central area, roughly 60′ x 70′ capable of seating 100-150 pupils in a variety of ways. These central spaces are undivided except by movable chalkboards, storage units, et cetera.

In addition to this totally flexible space, a number of fixed spaces are provided within each community. These are small or moderate-sized classrooms and linear laboratory spaces suitable for computer consoles, tape recorders, individual student work or for counseling or tutoring.

The principle is that the provision of these spaces will make the large central spaces truly flexible by reducing the demands upon its use.

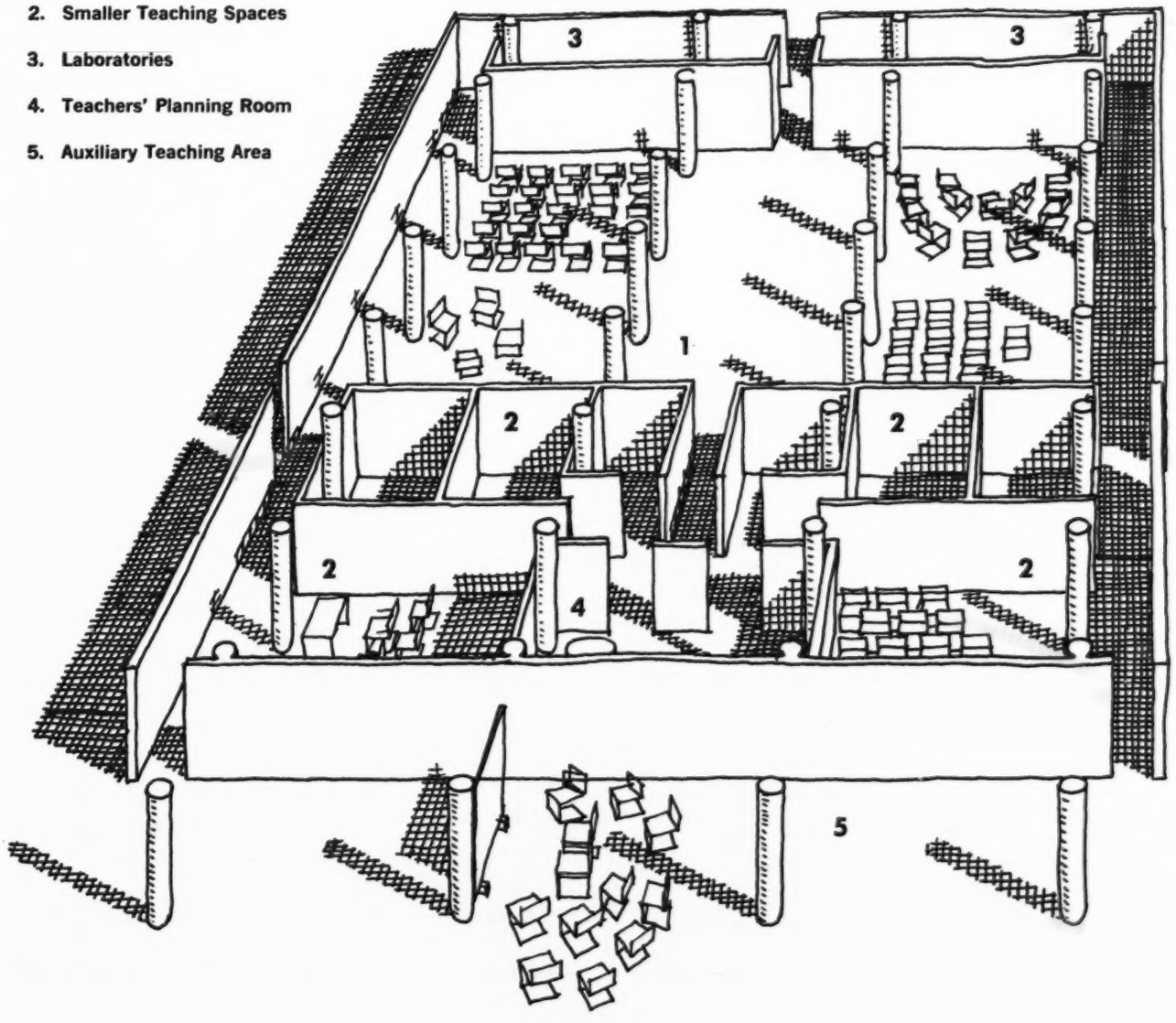
To provide each "community" with a sense of self-sufficiency, each contains a teachers' planning room and administrative area and storage space of a secure type.

Just beyond the "walls" of the community, along the most private corridor are wall carrels for approximately 30 students.

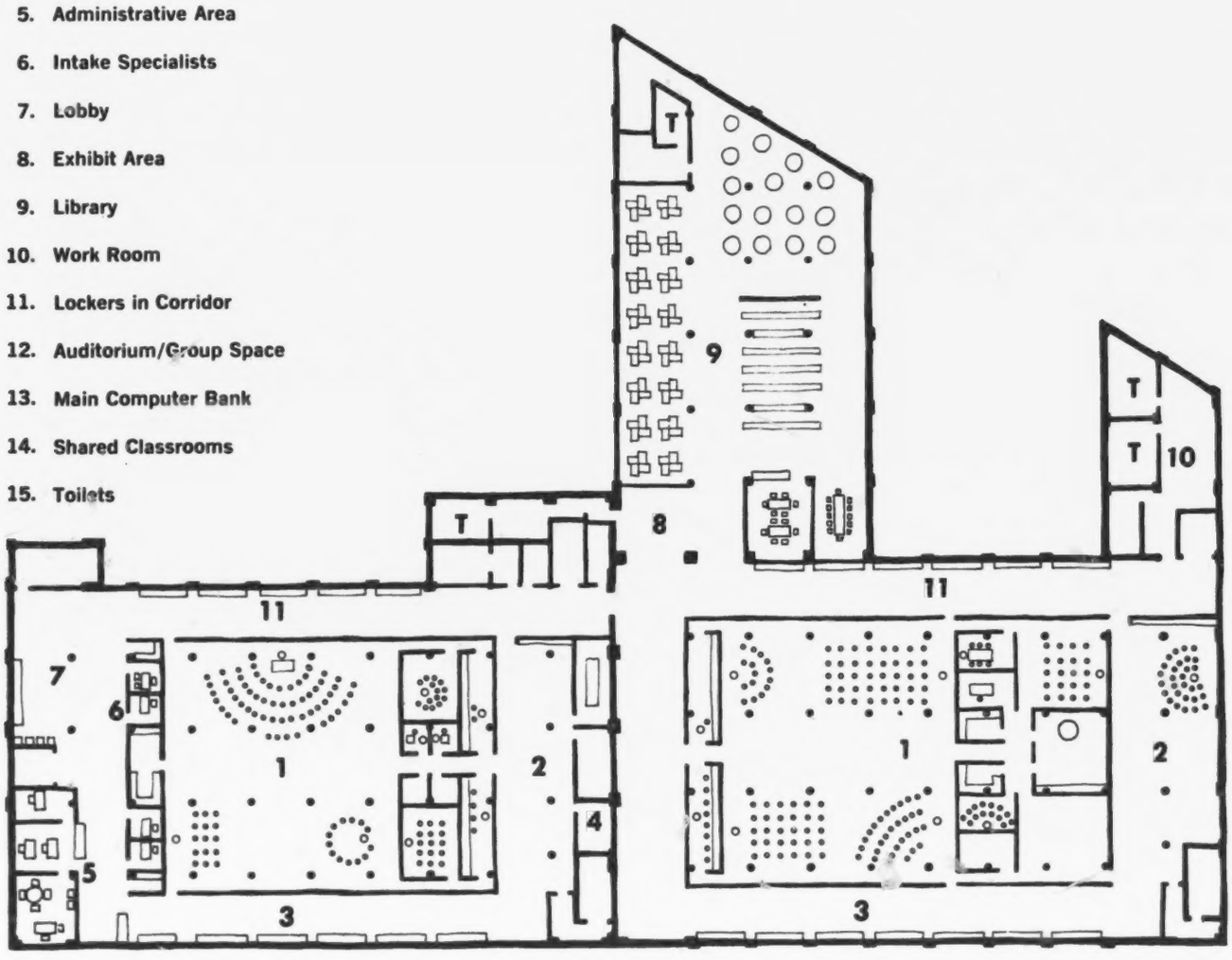
The corridor is broadened at one end where traffic is not expected to be a factor for use as alternate teaching and activity areas beyond the sound controlled spaces.

The public corridors connecting stairs, toilets, and supporting services, are then turned over to lockers and heavy circulation.

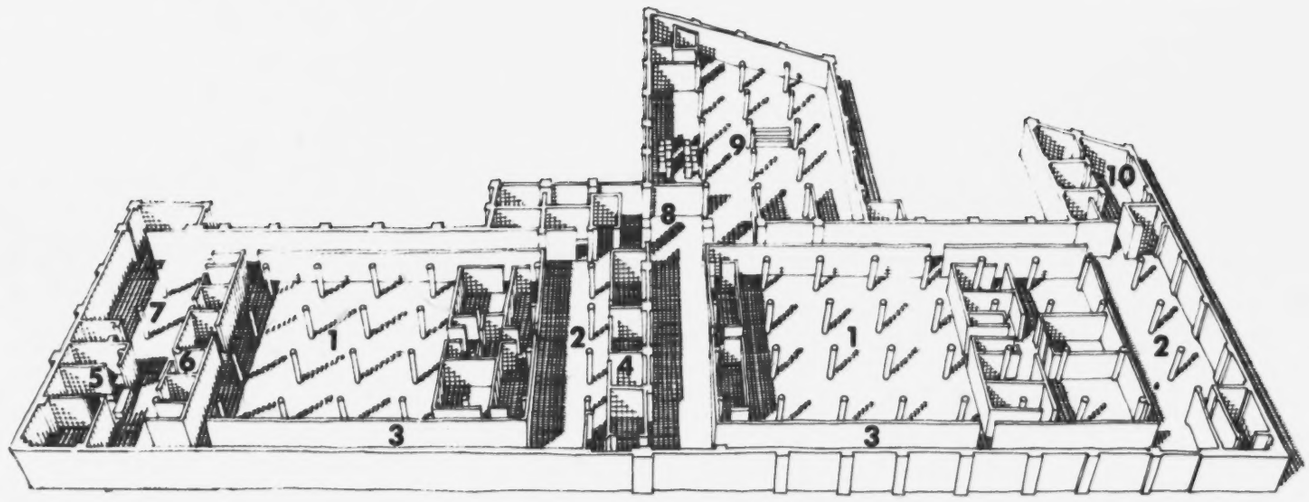
1. Flexible Teaching Space
2. Smaller Teaching Spaces
3. Laboratories
4. Teachers' Planning Room
5. Auxiliary Teaching Area



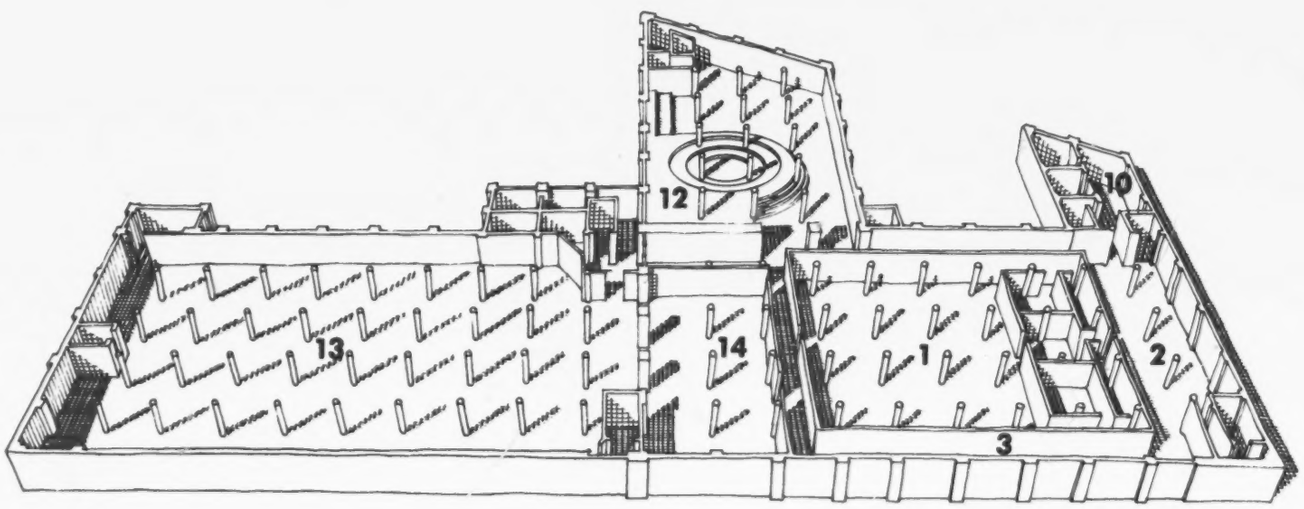
1. Teaching Community
2. Auxiliary Teaching Area
3. Carrels in Corridor
4. Central Storage
5. Administrative Area
6. Intake Specialists
7. Lobby
8. Exhibit Area
9. Library
10. Work Room
11. Lockers in Corridor
12. Auditorium/Group Space
13. Main Computer Bank
14. Shared Classrooms
15. Toilets



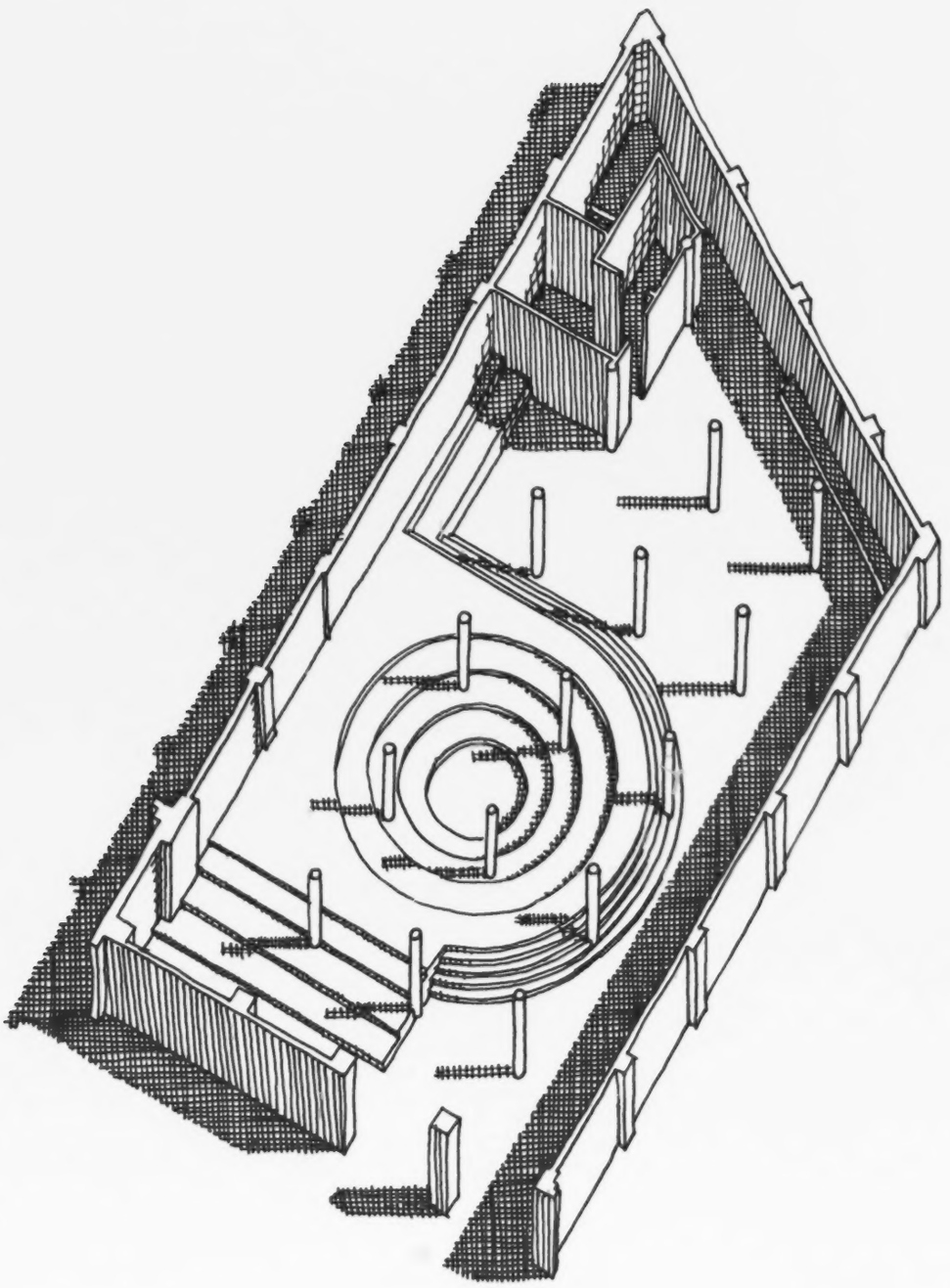
6TH FLOOR



6TH FLOOR



5TH FLOOR



SUPPORTING FUNCTIONS

Library: The library is proposed as the entire east wing on the sixth floor with various items of movable furniture including carrels, movable book stacks and tables and chairs.

Auditorium: The auditorium/group space occupies the entire east wing on the fifth floor. Studies developed the central amphitheater as most practical for large groups. This is not ideal for movie projection but it became apparent that no solution was available to the problem of sight lines on single screen projection beyond free floor space such as that in the teaching "communities."

Therefore, priority was given to intimacy, flexibility and quality of space.

Administrative Areas: Administrative areas are limited to the elevator lobby along Luzerne Street where easy access is provided through an exhibit-lobby-waiting area to intake specialists and the director's offices.

Central Storage: Central storage is located in the center of the building near the stairs on the sixth floor.

Work Areas: The work areas in the southeast corners of both the fifth and sixth floors are ideal for special treatment, water resistant flooring, benches, et cetera, but the complications with the toilet rooms must be resolved.

MATERIALS AND EQUIPMENT

Floors carpeted throughout except for toilet rooms and workrooms.

Acoustical hung ceiling, recessed lighting fixtures.

Partitions, movable metal stud system, ceiling high along the corridors, 8′ high within the community, determined by door head height. Folding screens where proposed to be the same height as lower partitions. Other movable screens to be furniture or working surfaces.

All furniture movable. Storage in storage cabinets locked for security or in open shelves. Wall counters for laboratory use and for use as carrels, to be made up of tables placed against the wall.

All rooms should be capable of easy conversion to other uses or redivision to other dimensions. Power, communications, TV antennae, et cetera, should use column mounts as much as possible to separate wall systems from power source and encourage flexibility.

Color: Color should be simple and coordinated by a system (i.e., enclave walls, internal walls, building walls). Bright colors are a natural input via furniture, tackboards, art work, et cetera.

Lockers: Lockers should be located along the masonry walls of the major circulation corridors only. If necessary, doubled lockers can be studied for space saving. The loss of light from the windows will be negligible and there is no view.

SUMMATION

The purpose originally stated was to provide information on the positive and negative aspects of utilizing industrial and commercial structures for educational functions through the vehicle of a "case study."

Assuming benefits in costs, immediate availability, elimination of condemnation and residential relocation, this study was directed toward the physical aspects of space utilization, circulation and adaptability.

In this area the study has revealed great potentialities which more than offset the limitations.

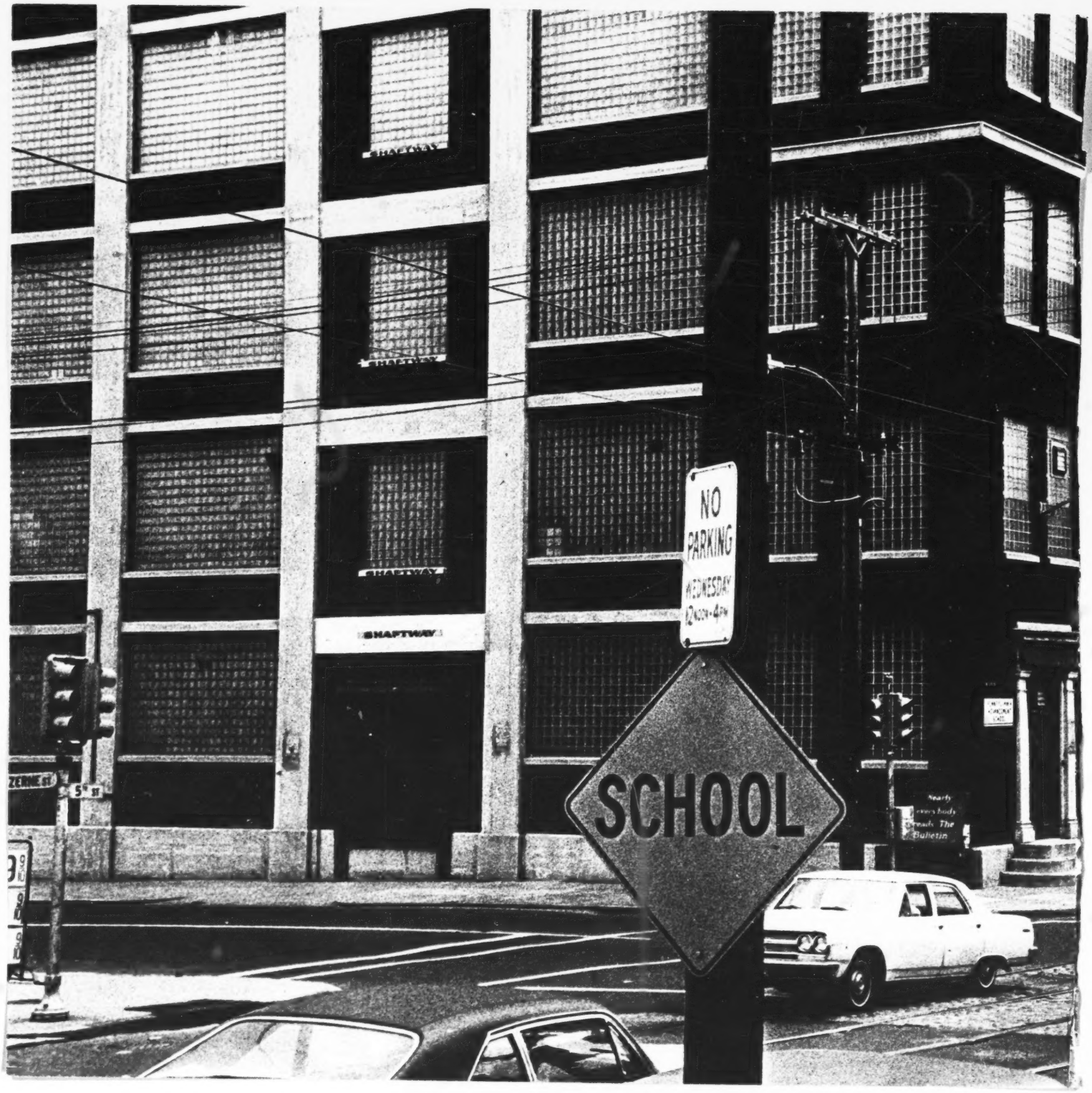
The plans for the Intensive Learning Center with its rigorous requirements for flexibility, group organization and space interrelationships indicate that with imaginative but realistic planning this structure is not a major limitation. It may, in actual fact, offer greater freedom than a conventional school building designed for individual 30-pupil classrooms.

Similarly, conventional classrooms with limited combination capabilities can easily be incorporated with the ready capability for conversion to many varied systems of classroom organization.

There are within the city many other commercial and industrial buildings which would present very similar problems and potentialities.

The use of the 5th and Luzerne Streets building and others like it offers a valuable alternative in answer to some of the most difficult school planning and construction problems facing Philadelphia today.

Photograph David Greenberg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